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PATENT ABSTRACTS OF JAPAN

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(71)Applicant : C C S KK

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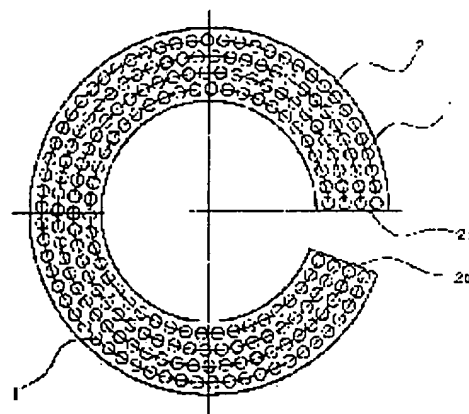
(72)Inventor : YONEDA KENJI

(54) MANUFACTURE OF LIGHTING SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a lighting system, in an easy manner, wherein a plurality of illuminants are arranged in a truncated cone recessed surface, by implanting the illuminants in an annular ring-shaped bendable board having a notch with the board being held in a planar state, and by joining notch sides of the board with each other such that the illuminants are positioned on the recessed surface side.

SOLUTION: With an annular ring-shaped bendable printed circuit board 2 having a notch being held in a planar state, illuminants 1 are implanted in the board 2 by the method of soldering or the like. After that, when one cut-out side 2a of the board 2 and the other cut-out side 2b thereof are simply joined with or held close to each other, the printed circuit board 2 is necessarily formed into a truncated circular cone shape, and the illuminants 1 are arranged on the truncated circular cone recessed surface 2c. At this point, a power supply cable is also wired on the board 2 by the method of soldering or the like. A lighting system is completed by attaching the thus formed board 2 and illuminants 1 to a lighting case with a holding frame.



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CLAIMS

[Claim(s)]

[Claim 1] a part of the manufacture approach of the lighting system characterized by obtaining the lighting system which comes to arrange two or more emitters on a truncated cone concave surface by joining or contiguity holding one notching side of this substrate, and the notching side of another side so that an emitter may be located at a concave surface side after an appropriate time by implanting an emitter in this substrate after holding the turnable substrate of the shape of a circular ring which has notching in the flat-surface condition.

[Claim 2] The manufacture approach of a lighting system according to claim 1 that said substrate is characterized by being a printed-circuit board.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approach of the lighting system used suitably, when carrying out an examination of products with reflected illumination.

[0002]

[Description of the Prior Art] As an approach of conducting surface analysis of a product etc., it illuminates for a product using the lighting system which emits light from a base, and, more generally than before, the method of performing viewing or photography and inspecting the reflected light [near this lighting system], is learned. If luminous-intensity nonuniformity exists in a control surface at this time, the case where faults, such as a very small blemish of a control surface and result condition, are undetectable will arise. Therefore, emitters, such as two or more LED, are everywhere laid on a lighting-system base, and what was made into structure which is made to carry out field luminescence of the light-emitting part, and keeps the luminous intensity of a control surface constant without nonuniformity is often used. Especially, when an inspected object is three-dimensional, and it is necessary to illuminate so that it may cover also from a perimeter only from an one direction to an inspected object, what has the structure which comes to arrange two or more emitters on a truncated cone concave surface is used for the luminescence side at the base of a lighting system in many cases.

[0003]

[Problem(s) to be Solved by the Invention] By the way, in order to lay an emitter everywhere on the base of this lighting system as it is the lighting system of the above configurations, this lighting-system base was processed a truncated cone concave surface or in the shape of a cone concave surface, two or more these concave surfaces were punched, the emitter was respectively

laid under this hole directly, and the complicated process of giving an arrangements line was still more nearly required for each emitter. For this reason, since all processes, such as base processing of equipment and a punching include angle, differed in order assembly is difficult and to manufacture the lighting system of the variety which changed whenever [angle of emergence / of light] not to mention assembly time amount becoming long, the fault of being hard to standardize an activity arose.

[0004] This invention is made in view of such the actual condition, and aims at offering the manufacture approach of the lighting system characterized by the ability to manufacture easily the lighting system which comes to arrange two or more emitters on a truncated cone concave surface.

[0005]

[Means for Solving the Problem] In order to solve the above-mentioned trouble, a part of this invention implants an emitter in this substrate, after holding the turnable substrate of the shape of a circular ring which has notching in the flat-surface condition, and he is trying to join or contiguity hold so that an emitter may be located in after an appropriate time in one notching side of this substrate, and the notching side of another side at a concave surface side. By this approach, two or more emitters can be easily arranged on a truncated cone concave surface.

[0006]

[Embodiment of the Invention] Namely, a part of this invention implants emitters, such as LED, in this substrate, after holding the turnable substrate of the shape of a circular ring which has notching in the flat-surface condition. After an appropriate time One notching side of this substrate, and the notching side of another side so that an emitter may be located in a concave surface side It is the manufacture approach of the lighting system characterized by obtaining the lighting system which arranges two or more emitters on a truncated cone concave surface, and comes to attach an emitter in a lighting-system base this whole substrate by joining or contiguity holding.

[0007] In order to do the wiring activity of each emitter, and the implantation activity to a substrate on coincidence and to simplify assembly operation further especially, it is desirable to use a printed-circuit board for this substrate.

[0008]

[Example] Hereafter, one example of this invention is explained with reference to a drawing. In drawing 1 , in lighting-system 4 base, the illuminants 1, such as two or more LED, are arranged at truncated cone concave surface 2c on the printed-circuit board 2 with a turnable flexible substrate etc., and the lighting case 3 holds the illuminant 1 the whole substrate 2. Power is supplied to each illuminant 1 from a power cable 5 through said substrate 2. The lighting case 3 has the feed hole 32 for viewing or photography, and said emitter 1 and the maintenance frame 33 of a substrate 2. Moreover, the female screw 31 drilled by the lighting case 3 is for attaching a lighting system 4.

[0009] In such a configuration, the manufacture approach of the lighting system by this invention is explained. After holding the turnable printed-circuit board 2 of the shape of a

circular ring which has notching in part as shown in drawing 2 in the flat-surface condition, an emitter 1 is implanted in this substrate 2 by approaches, such as soldering. After an appropriate time, only by joining or contiguity holding one notching side 2a of this substrate 2, and notching side 2b of another side so that an emitter 1 may be located at a concave surface side, this printed circuit board 2 serves as a truncated cone mold inevitably, and an emitter 1 is arranged at truncated cone concave surface 2c. At this time, a power cable 5 also wires this substrate 2 with soldering etc. Thus, the substrate 2 and emitter 1 which were formed are attached in the lighting case 3 with the maintenance frame 33, and this lighting system 4 is completed.

[0010] Since in the manufacture approach of such a lighting system 4 the printed-circuit board 2 is used in becoming possible by the same approach as carrying electronic parts in the usual printed-circuit board as usual, since the arrangement to truncated cone concave surface 2c of an emitter 1 can carry out in the state of a flat surface, implanting an emitter 1 in a substrate 2 by approaches, such as soldering, will serve as a wiring activity to coincidence, and assembly operation is simplified. Moreover, only by joining or contiguity holding one notching side 2a of this substrate 2, and notching side 2b of another side so that an emitter 1 may be located in a concave surface side, this printed circuit board 2 is crooked, and serves as a truncated cone form inevitably, and it becomes possible to arrange an emitter 1 to truncated cone concave surface 2c easily. It becomes unnecessary and to be able to attach easily in lighting case 3 base the substrate 2 and emitter 1 which were formed in this way with the maintenance frame 33, and to drill cone concave surface-like processing and the hole for emitter laying-under-the-ground maintenance in the lighting case 3. Moreover, as shown in drawing 3 and drawing 4, when the truncated cone side which has the magnitude and the include angle of arbitration can be easily manufactured by changing the magnitude of the diameter of a circular ring of a substrate 2, or notching, if the maintenance frame 33 is changed so that it may be suited, modification of a luminescence include angle can respond easily by modification of some lighting systems.

[0011] In addition, this invention is not limited to the example explained above. For example, a substrate 2 may be made into an ellipse ring with notching, and you may carry out changing a luminescence side configuration etc. In addition, the configuration of each part is not limited to the example of illustration, and can deform variously in the range which does not deviate from the meaning of this invention.

[0012]

[Effect of the Invention] This invention is carried out with a gestalt which was explained above, and does so effectiveness which is indicated below. An emitter is implanted in this substrate, after using the turnable substrate of the shape of a circular ring which has notching in part and holding this substrate in the flat-surface condition. Since two or more emitters can be easily arranged after an appropriate time at a truncated cone concave surface by joining or contiguity holding one notching side of this substrate, and the notching side of another side so that an emitter may be located at a concave surface side, Complicated processing to a lighting-system base becomes unnecessary, assembly also becomes easy, and assembly time amount can be shortened. Moreover, since whenever [luminescence face angle] can be easily changed by

modification of the diameter of a circular ring of a substrate, and the magnitude of notching, manufacture of the lighting system of the variety which changed whenever [angle-of-emergence / of light] becomes easy so that it may be suitable for the lighting of an inspected object.

[0013] Moreover, if a printed-circuit board is used for this substrate, in order that the implantation activity to the substrate of each emitter may serve as a wiring activity, the complicated activity of giving an arrangements line to each emitter is omitted, and assembly operation is simplified further.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The cross-sectional view of the lighting system in which one example of this invention is shown.

[Drawing 2] The front view showing the substrate carrying the emitter before the assembly of the lighting system in drawing 1 .

[Drawing 3] The cross-sectional view of the lighting system in which the modification of this example is shown.

[Drawing 4] The front view showing the substrate carrying the emitter before the assembly of the lighting system in drawing 3 .

[Description of Notations]

1 ... Emitter

2 ... Substrate

2a ... Notching side

2b ... The notching side of another side

2c ... Truncated cone concave surface

4 ... Lighting system

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(56) 参考文献 特開 平8-106809 (J P, A)

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実開 平5-25749 (J P, U)

特公 昭52-24797 (J P, B 2)

最終頁に続く

(54) 【発明の名称】 照明装置の製造方法

1

(57) 【特許請求の範囲】

【請求項1】 保持枠に複数のLEDを保持させてなる製品表面検査用の照明装置に適用される製造方法であって、前記保持枠に適合するようにその大きさを設定された切り欠きを有する円環状の屈曲可能なプリント配線基板を、平面状態に保持した上で、該基板にLEDをはんだ付けによりくまなく植設し、しかる後に、該基板の一方の切り欠き辺と他方の切り欠き辺とをLEDが凹面側に位置するように接合または近接保持することによって、複数のLEDを切頭円錐凹面に配置することを特徴とする照明装置の製造方法。

【請求項2】 照明装置が、照明ケースとその底面に保持される保持枠とを具備するものであり、前記LEDを配設され切頭円錐形に形成された前記基板を、照明ケースと保持枠との間に挟み込むようにして保持することを特

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徴とする請求項1記載の照明装置の製造方法。

【請求項3】 前記基板にLEDを略等密度で植設することを特徴とする請求項1または2記載の照明装置の製造方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、反射照明によって製品検査をする場合等に好適に使用される照明装置の製造方法に関するものである。

【0002】

【従来の技術】 製品の表面検査等を行う方法として、底面より発光する照明装置を用いて製品に照光し、その反射光を該照明装置の近傍において目視あるいは撮影等を行って検査する方法が従来より一般的に知られている。この時、検査面において光度ムラが存在すると、検査面

の微少な傷や仕上がり具合等の不具合を検出できない場合が生じる。したがって、複数のLED等の発光体を照明装置底面にくまなく敷設し、発光部を面発光させて検査面の光度をムラなく一定に保つような構造にしたものがよく使用されている。特に、被検査体が立体的である場合など、被検査体に対して、一方向からだけでなく周囲方向からも覆うように照明する必要があるときには、照明装置底面の発光面に、複数の発光体を切頭円錐凹面に配置してなる構造を有するものを使用する場合が多い。

【0003】

【発明が解決しようとする課題】ところで、前記のような構成の照明装置であると、発光体を該照明装置の底面にくまなく敷設するためには、該照明装置底面を切頭円錐凹面または円錐凹面状に加工し、該凹面に複数穿孔し、発光体を該孔に各々直接埋設し、さらに各々の発光体に手配線を施すという複雑な工程が必要であった。このため、組立が困難で組立時間が長くなるのはもちろんのこと、光の射出角度を変えた多種の照明装置を製造するには、装置の底面加工や穿孔角度等あらゆる工程が異なってくるため、作業を標準化しにくいという不具合が生じた。

【0004】本発明は、このような実情に鑑みてなされたものであって、複数のLEDを切頭円錐凹面に配置してなる照明装置を容易に製造し得ることを特徴とする照明装置の製造方法を提供することを目的としている。

【0005】

【課題を解決するための手段】上記の問題点を解決するために、本発明は、一部切り欠きを有する円環状の屈曲可能なプリント配線基板を平面状態に保持した上で該基板にLEDを植設し、しかる後に、該基板の一方の切り欠き辺と他方の切り欠き辺とをLEDが凹面側に位置するように接合または近接保持するようにしている。この方法によって、容易に複数のLEDを切頭円錐凹面に配置し得る。

【0006】

【発明の実施の形態】すなわち、本発明は、保持枠に複数のLEDを保持させてなる製品表面検査用の照明装置に適用される製造方法であって、前記保持枠に適合するようにその大きさを設定された切り欠きを有する円環状の屈曲可能なプリント配線基板を、平面状態に保持した上で、該基板にLEDをはんだ付けによりくまなく植設し、しかる後に、該基板の一方の切り欠き辺と他方の切り欠き辺とをLEDが凹面側に位置するように接合または近接保持することによって、複数のLEDを切頭円錐凹面に配置することを特徴とする。

【0007】具体的には、照明装置が、照明ケースとその底面に保持される保持枠とを具備するものであり、前記LEDを配設され切頭円錐形に形成された前記基板を、照明ケースと保持枠との間に挟み込むようにして保

持する方法や、前記基板にLEDを略等密度で実装する方法が挙げられる。

【0008】

【実施例】以下、本発明の一実施例を、図面を参照して説明する。図1において、照明装置4底面には、複数のLEDである発光体1がフレキシブル基板等の屈曲可能なプリント配線基板2上の切頭円錐凹面2cに配置されており、照明ケース3が基板2ごと発光体1を保持している。各発光体1には、前記基板2を介して電源ケーブル5から電力が供給される。照明ケース3は目視あるいは撮影等のための中心孔32と、前記発光体1および基板2の保持枠33を有している。また、照明ケース3に穿設されためねじ31は、照明装置4を取着するためのものである。

【0009】このような構成において、本発明による照明装置の製造方法について説明する。図2に示すような、一部切り欠きを有する円環状の屈曲可能なプリント配線基板2を平面状態に保持した上で、該基板2に発光体1をはんだ付けにより植設する。しかる後に、該基板2の一方の切り欠き辺2aと他方の切り欠き辺2bとを発光体1が凹面側に位置するように接合または近接保持するだけで、該プリント基板2は必然的に切頭円錐型となり、発光体1は切頭円錐凹面2cに配置される。このとき、電源ケーブル5も該基板2にはんだ付け等によって配線する。このように形成された基板2および発光体1を照明ケース3に保持枠33によって取着して、該照明装置4は完成する。

【0010】このような照明装置4の製造方法の場合には、発光体1の切頭円錐凹面2cへの配置が、平面状態で行えるため、従来どおり電子部品を通常のプリント配線基板に搭載するのと同じ方法で可能になるうえ、プリント配線基板2を使用しているため、基板2に発光体1をはんだ付け等の方法で植設することが同時に配線作業を兼ねることになり組立作業が簡略化される。また、該基板2の一方の切り欠き辺2aと他方の切り欠き辺2bとを発光体1が凹面側に位置するように接合または近接保持するだけで、該プリント基板2は屈曲し必然的に切頭円錐形となり、発光体1を容易に切頭円錐凹面2cに配置することが可能となる。そして、このように形成された基板2および発光体1は、照明ケース3底面に保持枠33によって容易に取着でき、照明ケース3に円錐凹面状の加工や、発光体埋設保持用の孔を穿設する必要がなくなる。また、図3および図4に示すように、基板2の円環径や切り欠きの大きさを変えることで、任意の大きさや角度を有する切頭円錐面を容易に製作できる上、それに適合し得るよう保持枠33を変更すれば、発光角度の変更が、照明装置の一部の変更で容易に対応できる。

【0011】なお、本発明は以上説明した実施例に限定されるものではない。例えば、基板2を切り欠きを有し

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た楕円環にして、発光面形状を変化させたりするなどしてもよい。その他、各部の構成は図示例に限定されるものではなく、本発明の趣旨を逸脱しない範囲で種々変形が可能である。

【0012】

【発明の効果】本発明は、以上説明したような形態で実施され、以下に記載されるような効果を奏する。一部切り欠きを有する円環状の屈曲可能なプリント配線基板を使用し、該基板を平面状態に保持した上で該基板にLEDを実装し、しかる後に、該基板の一方の切り欠き辺と他方の切り欠き辺とをLEDが凹面側に位置するように接合または近接保持することによって、複数のLEDを切頭円錐凹面に容易に配置しうするため、照明装置底面への複雑な加工が不要となり、組立も容易になって組立時間を短縮できる。また、基板の円環径と切り欠きの大きさの変更によって発光面角度を容易に変更できるため、被検査体の照明に適するように、光の射出角度を変えた多種の照明装置の製造が容易となる。

*【0013】また、プリント配線基板を用いているので、各LEDの基板への植設作業が配線作業を兼ねるため、各々のLEDに手配線を施すという複雑な作業が省略され、組立作業がさらに簡略化される。

【図面の簡単な説明】

【図1】本発明の一実施例を示す照明装置の横断面図。

【図2】図1における照明装置の組み立て前の、発光体を搭載した基板を示す正面図。

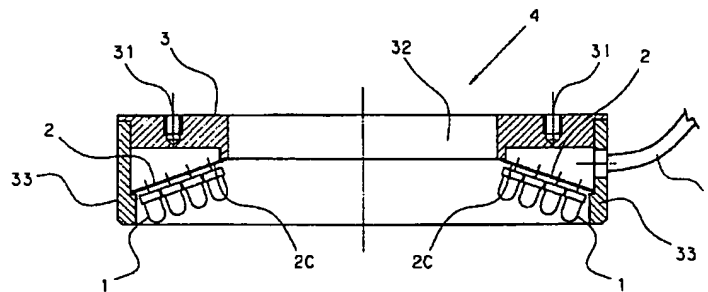
【図3】同実施例の変形例を示す照明装置の横断面図。

10 【図4】図3における照明装置の組み立て前の、発光体を搭載した基板を示す正面図。

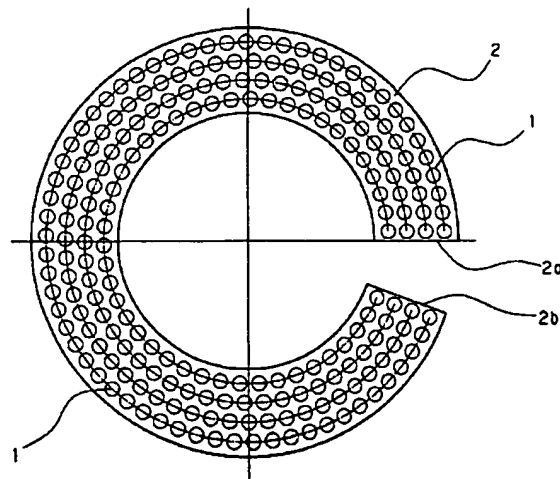
【符号の説明】

- 1・・・発光体
- 2・・・基板
- 2a・・・切り欠き辺
- 2b・・・他方の切り欠き辺
- 2c・・・切頭円錐凹面
- * 4・・・照明装置

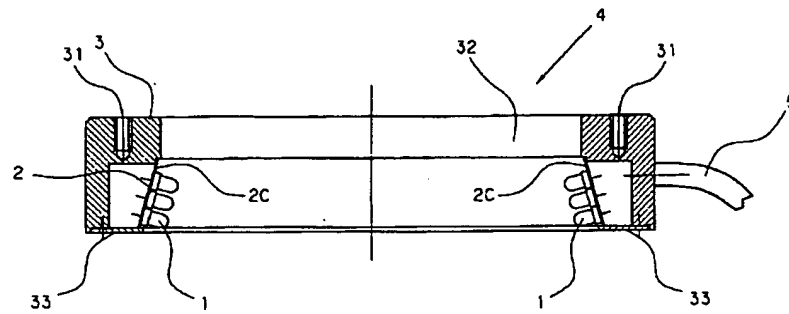
【図1】



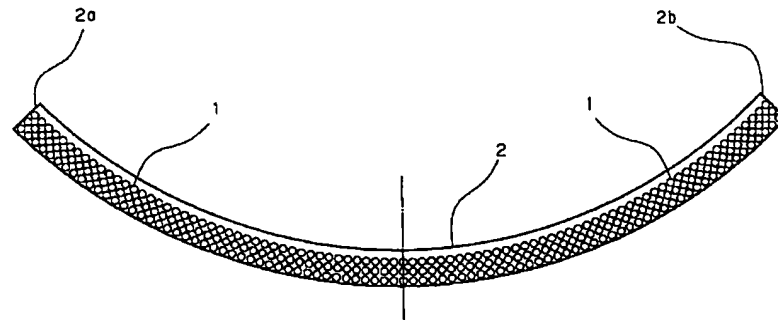
【図2】



【図3】



【図4】



フロントページの続き

(58)調査した分野(Int.Cl.⁶, DB名)

F21V 19/00

F21S 1/00

G03B 15/00

H01L 33/00